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(54) **SYSTEM FOR CONTROLLING STEAM TEMPERATURE**

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(52) **U.S. Cl.** **60/39.182**; 60/653; 60/679

(58) **Field of Classification Search** 60/39.02, 60/39.182, 39.19, 39.83, 653, 679
See application file for complete search history.

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(57) **ABSTRACT**

A system for controlling steam temperature that includes steam circuit including a reheater circuit, at least one reheater dilution region, at least one reheater dilution conduit, and at least one reheater supply region disposed upstream of the at least one reheater dilution region, wherein the at least one reheater supply region and the at least one reheater dilution region are associated via the reheater circuit and the at least one reheater dilution conduit.

12 Claims, 3 Drawing Sheets

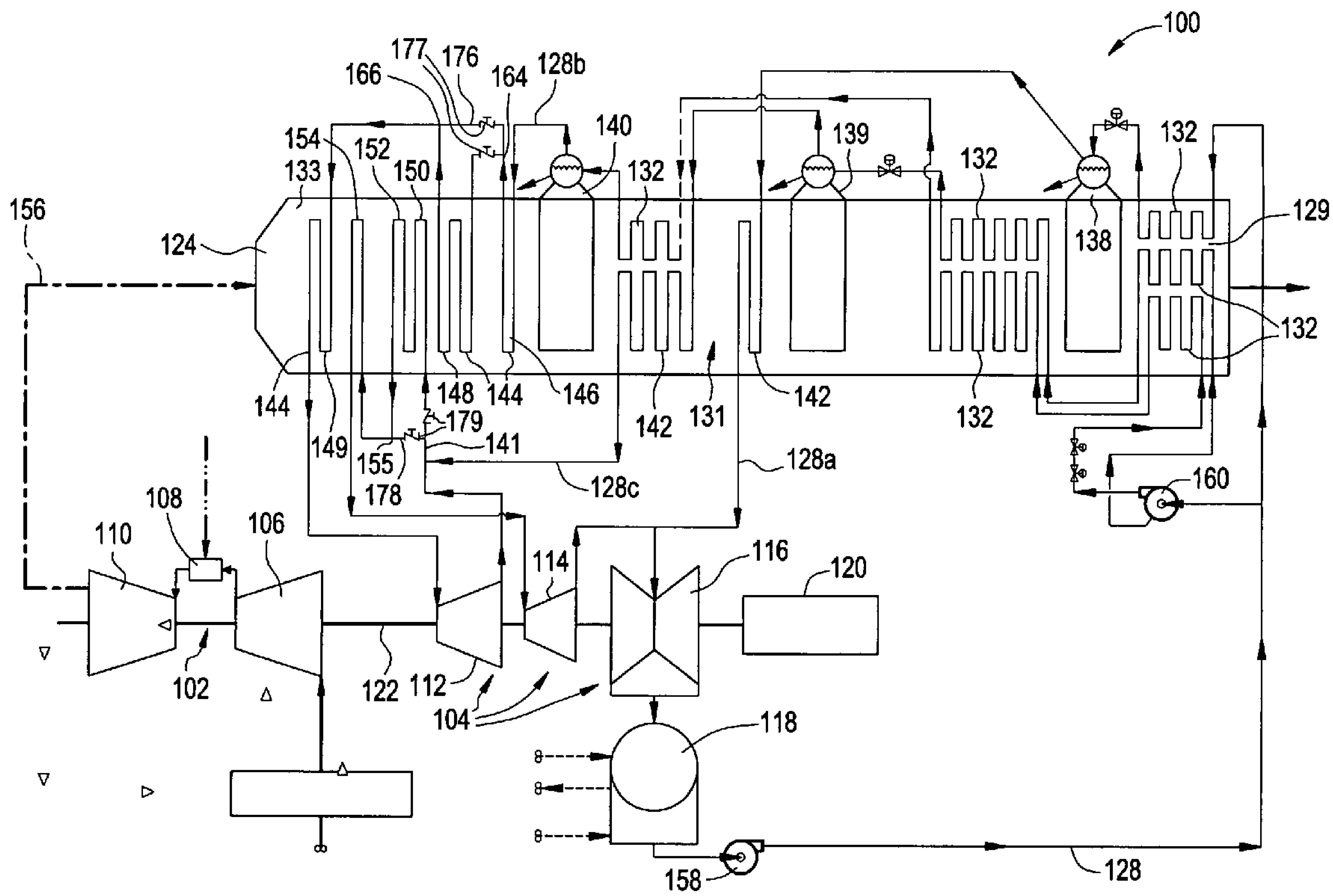
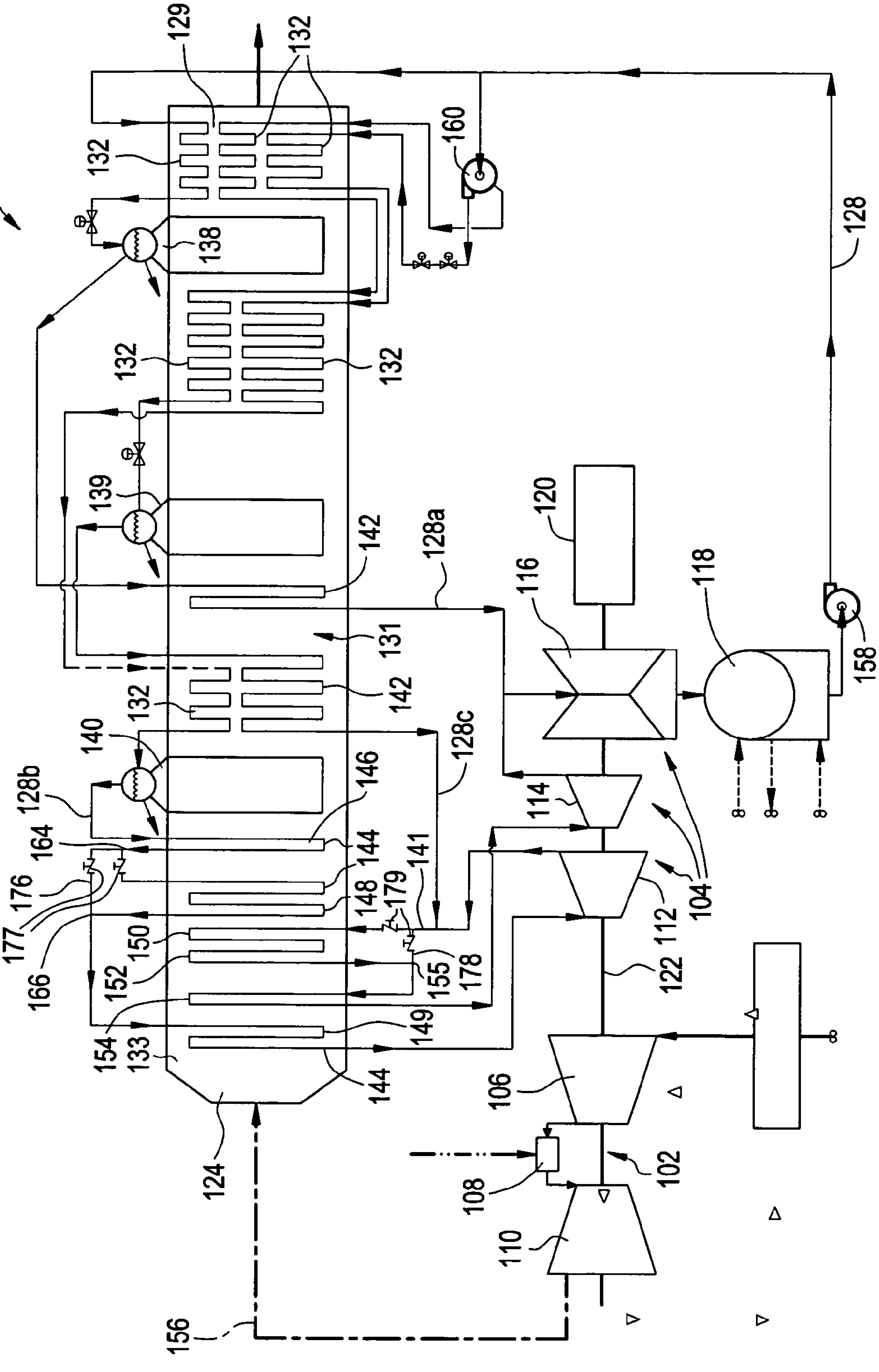


FIG. 1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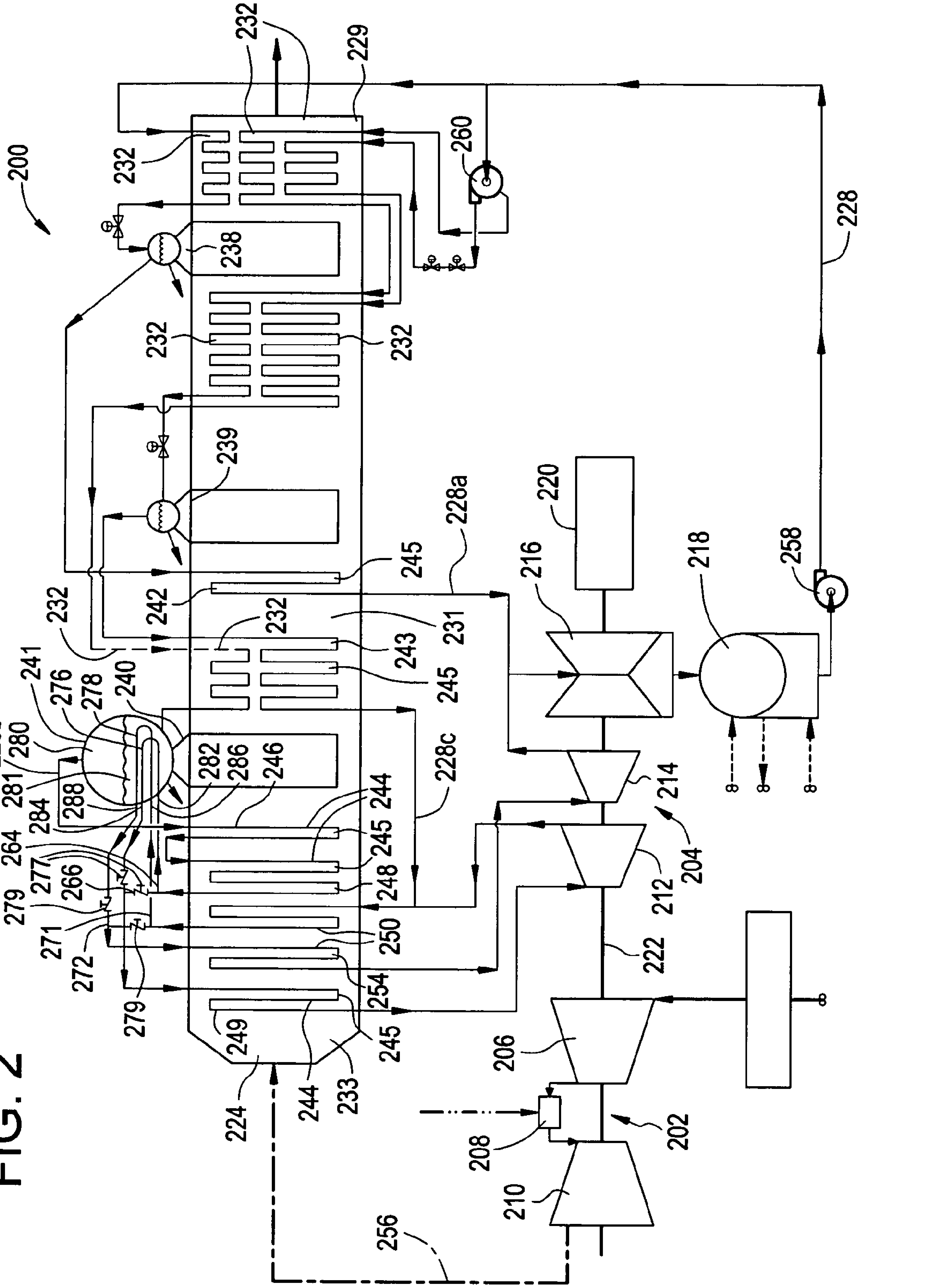
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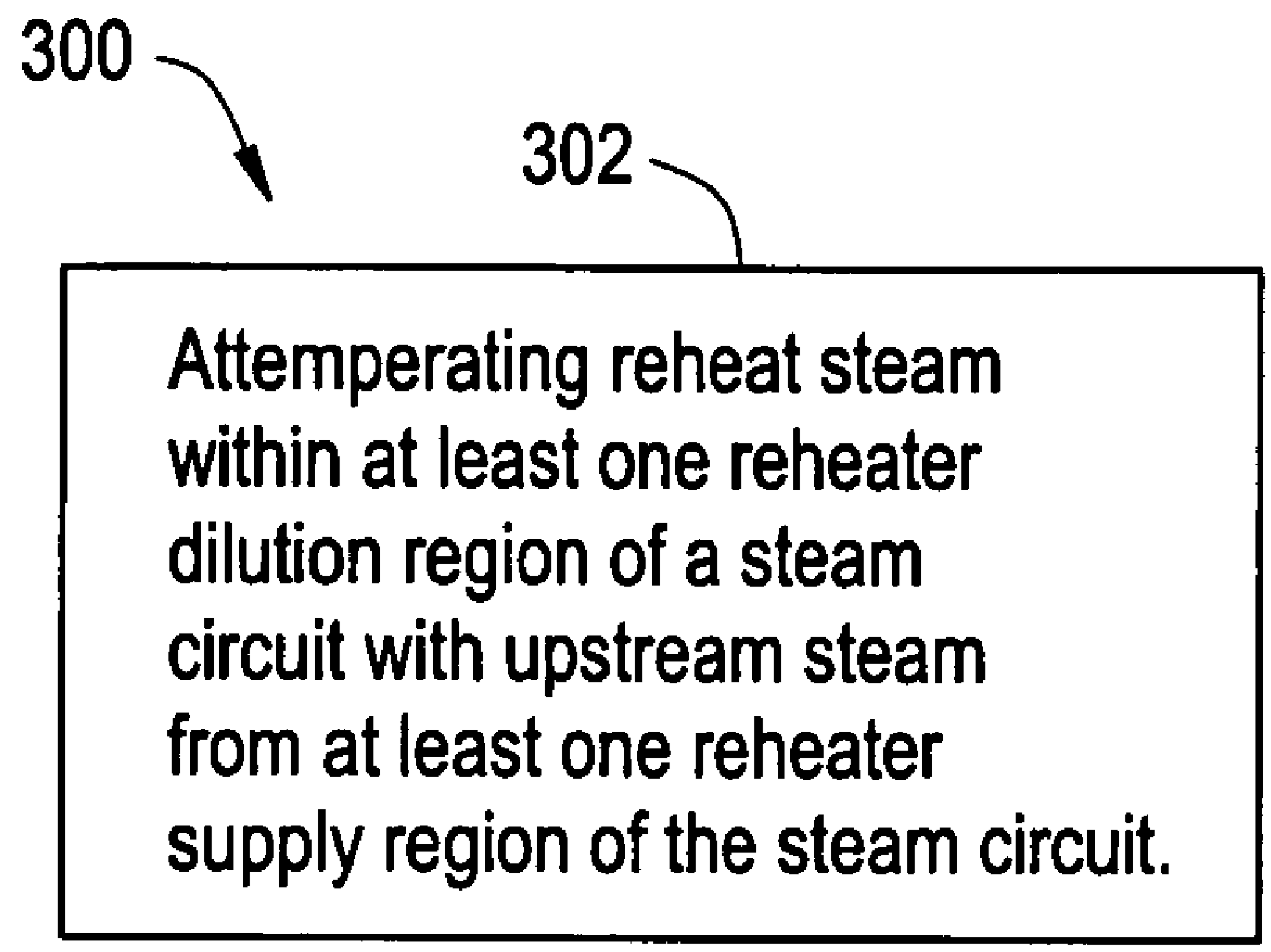
FIG. 2

FIG. 3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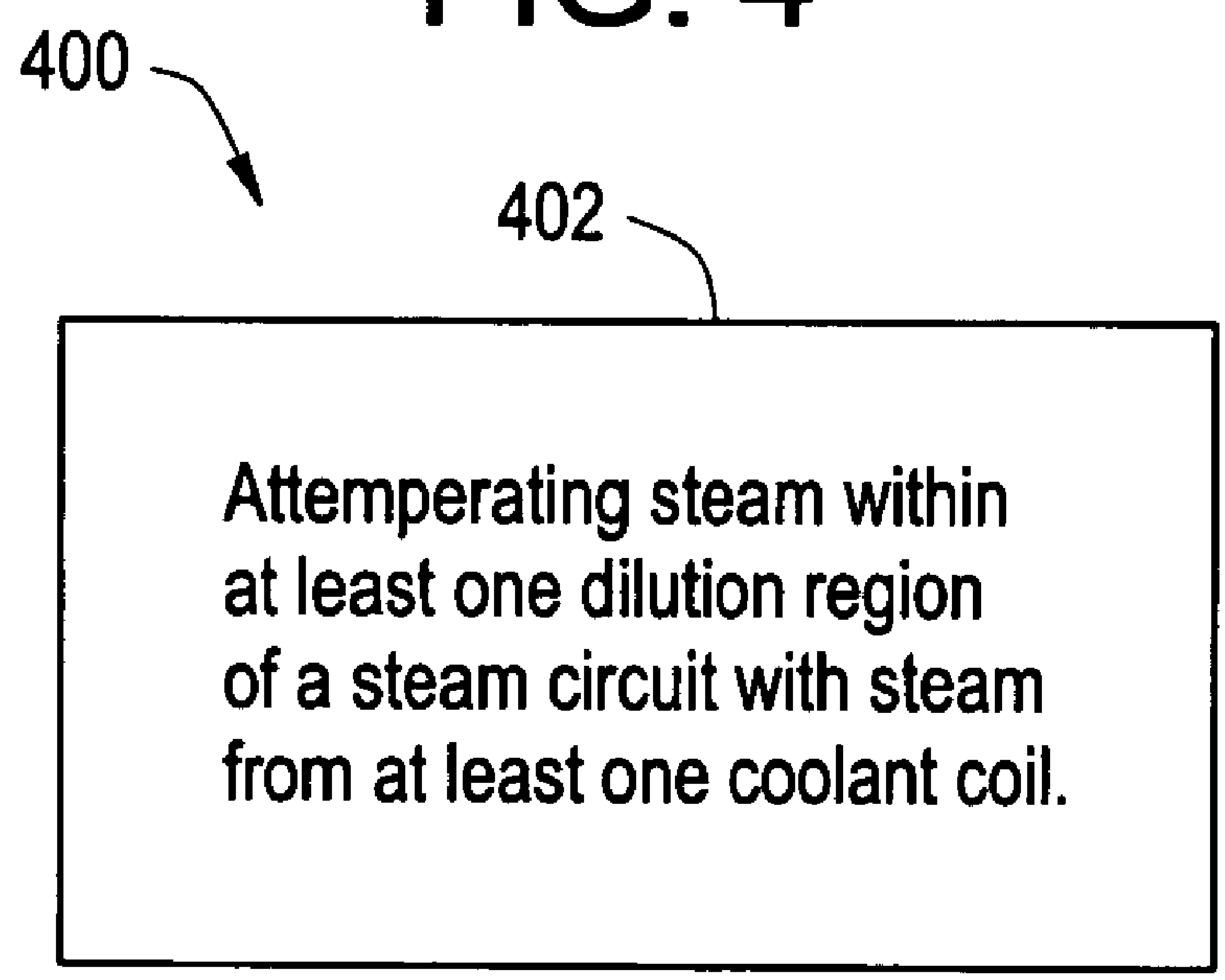
302
Attemperating reheat steam within at least one reheater dilution region of a steam circuit with upstream steam from at least one reheater supply region of the steam circuit.

FIG. 4


400
402
Attemperating steam within at least one dilution region of a steam circuit with steam from at least one coolant coil.

SYSTEM FOR CONTROLLING STEAM TEMPERATURE

FIELD OF THE INVENTION

This disclosure relates generally to a system for controlling steam temperature, and more particularly to a system for controlling steam temperature within combined cycle power generation system.

BACKGROUND OF THE INVENTION

In general, a combined cycle power generation system includes a gas turbine, a steam turbine, a steam cycle, and a multiple pressure combined cycle heat recovery steam generator (HRSG). Steam supply to the steam turbine from the HRSG must be temperature controlled in order to keep the steam temperature from exceeding the rated temperature of the HRSG, interconnecting steam piping, and the steam turbine. One method for controlling and limiting steam temperature includes injection of a water spray into a conventional spray attemperator located upstream (in relation to steam flow) of the final reheater and superheater passes. The water source is typically a high pressure feedwater pump located upstream of at least one economizer disposed within the HRSG.

Though water spray attemperation effectively controls and limits steam temperature, the water used in the spray can contain contaminants damaging to the gas/steam turbine. Water spray attemperation also causes significant reduction in combined cycle performance and efficiency due to the latent heat required for vaporization of the attemperation spray water, which effectively comes from the high level exhaust energy. There is a desire, therefore, for a combined cycle power generation system that controls/limits steam temperature without incurring a performance penalty resulting from use of high level exhaust energy to supply the latent heat of vaporization associated with water spray attemperation.

BRIEF DESCRIPTION OF THE INVENTION

Disclosed is a system for controlling steam temperature that includes a steam circuit including a reheater circuit, at least one reheater dilution region, at least one reheater dilution conduit, and at least one reheater supply region disposed upstream of the at least one reheater dilution region, wherein the at least one reheater supply region and the at least one reheater dilution region are associated via the reheater circuit and the at least one reheater dilution conduit.

Also disclosed is a system for controlling steam temperature that includes a steam circuit including and at least one dilution region and at least one supply region, at least one cooling area, and at least one cooling coil associating the at least one dilution region with the at least one supply region, wherein the at least one cooling coil is at least partially disposed within the at least one cooling area.

Additionally disclosed is a method for controlling steam temperature that includes attemperating reheat steam within at least one reheater dilution region of a steam circuit with steam from at least one reheater supply region of the steam circuit, wherein the at least one reheater supply region is disposed upstream of the dilution region.

Further disclosed is a method for controlling steam temperature that includes attemperating steam within at least one dilution region of a steam circuit with steam from at least one coolant coil, wherein the at least one cooling coil is disposed at least partially within at least one cooling area.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other features and advantages of the present invention should be more fully understood from the following detailed description of illustrative embodiments taken in conjuncture with the accompanying Figures in which like elements are numbered alike in the several Figures:

FIG. **1** is a schematic flow diagram of a system for controlling steam temperature without water attemperation or the performance penalty therefrom, wherein the system is in accordance with a first embodiment;

FIG. **2** is a schematic flow diagram of a system for controlling steam temperature without water attemperation or the performance penalty therefrom, wherein the system is in accordance with a second embodiment;

FIG. **3** is a block diagram illustrating a first method for controlling steam temperature without the latent heat of vaporization associated with water attemperation; and

FIG. **4** is a block diagram illustrating a second method for controlling steam temperature without the latent heat of vaporization associated with water attemperation.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. **1**, a first embodiment of a system **100** for controlling steam temperature is illustrated, and includes a gas turbine **102** and a steam turbine **104**. The gas turbine **102** includes a compressor **106**, a combustion area **108**, and a turbine **110**. The steam turbine **104** may include at least one high pressure section **112**, at least one intermediate pressure section **114**, and at least one low pressure section **116**, wherein the at least one low pressure section **116** may exhaust into a condenser **118**. The steam turbine **104** also drives a generator **120** that produces electrical power (or other load). The gas turbine **102** and steam turbine **104** are associated in tandem via a single shaft **122** that drives a single generator **120**, though each may alternately drive separate loads.

The gas turbine **102** and steam turbine **104** are additionally associated with a multi-pressure heat recovery steam generator (HRSG) **124**, which includes a high pressure (HP) region **133**, an intermediate pressure (IP) region **131**, and a low pressure (LP) region **129**. The HRSG **124** also includes a steam circuit which transports steam and water. The steam circuit is too expansive and complex to designate as a singular structure within the illustration, and thus will be named and numbered in sections hereinbelow. The HRSG **124** is associated with the gas turbine **102** via an exhaust gas conduit **156**, which transports heated gas into the HRSG **124**, and is associated with the steam turbine **104** via the steam circuit.

The steam circuit includes at least one economizer (illustrated throughout the HRSG at **132**), at least one evaporator (illustrated as an HP evaporator **140**, and IP evaporator **139**, and an LP evaporator **138**), at least one superheater **142**, and a reheater circuit **150**. The at least one superheater **142** to be discussed in detail is a high pressure (in relation to its positioning within the HRSG **124** and designated henceforth as HP) superheater circuit **144**, illustrated to include a first HP superheater section **146**, a second HP superheater section **148**, and a third HP superheater section **149**, although steam temperature control could be achieved with a single (one pass circuit) superheater section. The first HP superheater section **146**, the second HP superheater section **148**, and the third HP superheater section **149** are associated with each other within the HP superheater circuit **144** in a manner that allows steam to flow downstream from the first HP superheater section **146**, through the second HP superheater section **148**, and into the third HP superheater section **149**.

The HP superheater **144** further includes at least one superheater supply region, illustrated and referred to hereinafter as superheater supply region **164**, and at least one superheater dilution region, illustrated and referred to hereinafter as superheater dilution region **166**. The superheater dilution region **166** is disposed downstream (in relation to steam flow direction) of the superheater supply region **164**, and is associated with said the superheater supply region **164** via at least one superheater dilution conduit, illustrated and referred to hereinafter as superheater dilution conduit **176**, and the HP superheater circuit **144** (or the second HP superheater section **148**, as is shown in the illustration). The association via the superheater dilution conduit **176** allows for dilution of downstream steam (in relation to steam flow) from the second HP superheater section **148** with cooler steam from the upstream superheater supply region **164**.

As is mentioned above, the steam circuit includes the reheater circuit **150**. The reheater circuit **150** is illustrated to include a first reheater section **152** and a second reheater section **154**, although steam temperature control in the reheater circuit **150** could be achieved with a single (one pass circuit) reheater section. The first reheater section **152** and the second reheater section **154** are disposed within the reheater circuit **150** in a manner which allows steam to flow downstream from the first reheater section **152** to the second reheater section **154**.

Further disposed along the steam circuit is at least one reheater dilution region, illustrated and referred to hereinafter as reheater dilution region **155**, and at least one reheater supply region, illustrated and referred to hereinafter as reheater supply region **141**. The reheater supply region **141** is disposed upstream (in relation to steam flow through the steam circuit) of the reheater dilution region **155**, wherein the reheater supply region **141** and reheater dilution region **155** are associated via the reheater circuit **150** (or the first reheater section **152**, as is shown in the illustration), as well as at least one reheater dilution conduit, illustrated and referred to hereinafter as reheater dilution conduit **178**. The reheater dilution conduit **178** allows steam to bypass the first reheater section **152** and dilute reheated steam in the reheater dilution region **155** with cooler steam from the reheater supply region **141**. It should be appreciated however, that though the reheater dilution region **155** is illustrated within the multi pass/section reheater circuit, it may also be disposed downstream of a single pass/section reheater circuit, wherein the dilution conduit would bypass the reheater circuit altogether. It should be further appreciated that at least one steam flow controlling device will be associated with said reheater circuit **150** and said HP superheater circuit **144**, wherein the at least one steam flow control device may be a device such as but not limited to at least one control valve, illustrated as at least one superheater dilution valve **177** and at least one reheater dilution valve **179**.

With the components (excepting some illustrated steam circuit sections and pumps) of the system **100** introduced, the manner in which these components interact will now be discussed. Condensate is fed from the condenser **118** to the LP region **129** of the HRSG **124** via at least one condensate line **128** (section of the steam circuit) with the aid of a condensate pump **158**. The condensate subsequently traverses at least one economizer **132** and the LP evaporator **138**, before being superheated and returned to the at least one low pressure section **116** of the steam turbine **104** via at least one low pressure conduit **128***a* (section of the steam circuit).

With the aid of a pump **160**, feedwater also passes into the LP region **129** of the HRSG **124**, wherein the feedwater travels to at least one economizer and into the IP evaporator **139** and HP evaporator **140**. The HP evaporator **140** thus recovers exhaust energy necessary to supply a latent heat that converts feedwater to HP steam. Steam exiting the HP evaporator **140** is transported on to the HP superheater circuit **144** via a steam conduit **128***b* (section of the steam circuit). Similarly, the IP evaporator **139** also recovers exhaust energy necessary to supply a latent heat that converts feedwater to IP steam, wherein the steam is transported from the IP evaporator **139** to the reheater circuit **150** via at least one a steam conduit **128***c* (section of the steam circuit), and possibly the reheater supply region **141**.

Steam traveling from the HP evaporator **140** enters the HP superheater circuit **144** and travels through the first HP superheater section **146** into the superheater supply region **164**. From the superheater supply region **164** at least a portion of the steam may pass onto at least one of the second HP superheater section **148** and the superheater dilution conduit **176** with the aid of the at least one superheater dilution valve **177**.

Steam that has passed into the second HP superheater section **148** is heated and eventually enters the superheater supply region **164**. However, steam that entered the superheater dilution conduit **176** (under the control of at least one superheater dilution valve **177**) also travels from the superheater supply region **164** to the superheater dilution region **166**, and does so without being heated within the second HP superheater section **148**. The steam from the superheater dilution conduit **176** will thus dilute and cool the steam which has traversed and been heated in the second HP superheater section **148** without use of water spray attemperation. Eliminating water spray attemperation further eliminates the performance penalty associated with supplying the latent heat of vaporization for water spray entirely with exhaust energy hotter than the water saturation temperature. This improves cycle efficiency. It should be appreciated however, as was briefly mentioned above, that only one superheater pass is necessary to achieve a desired dilution. A superheater dilution conduit may transport diluting steam from a supply area anywhere upstream of a one pass/section HP superheater circuit to a dilution area disposed anywhere downstream (or in close proximity to) of a superheater exit in order to dilute superheated steam. Multiple sections are typically employed however, (as is illustrated) so as to improve operability and cost.

Referring now to the reheater circuit **150**, steam from at least one of the steam turbine **104** and the IP evaporator **139** is illustrated to enter the reheater supply region **141**, (though a reheater supply region may be disposed anywhere upstream of the reheater dilution region **155**). From the reheater supply region **141**, at least a portion of the steam passes into at least one of the first reheater section **152** and the reheater dilution conduit **178** under the control of the at least one reheater dilution valve **179**. Steam that enters the first reheater section **152**, which acts as the portion of the reheater circuit **150** that associates the reheater supply region **141** and the reheater dilution region **155**, is heated and passed to the reheater dilution region **155**, and eventually the second reheater section **154**. However, steam that entered the reheater dilution conduit **178** (under the control of at least one reheater dilution valve **179**) also travels from the reheater supply region **141** to the reheater dilution region **155**, and does so without being heated within the first reheater section **152**. This cooler steam from the at least one reheater dilution conduit **178** dilutes, and thus cools/controls the steam which has traversed and been heated in the first reheater section **152**, preventing steam in the reheater circuit **150** from exceeding the rated temperature of the HRSG **124**, the IP steam turbine **104**, and/or the steam circuit without use of water spray attemperation. Eliminating water spray attemperation further eliminates the performance penalty associated with providing the latent heat of vaporization of the water spray entirely with exhaust energy hotter than the water saturation temperature, improving combined cycle efficiency. Like with the superheater, it should be appreciated that only one reheater pass is necessary to achieve a desired dilution.

It should be appreciated that the system **100** may be employed in applications involving steam temperature control such as but not limited to combined cycle systems and direct fired steam cycles.

Referring to FIG. **2**, a second embodiment of a system **200** for controlling steam temperature is illustrated and includes a gas turbine **202** and a steam turbine **204**. The gas turbine **202** includes a compressor **206**, a combustion area **208**, and a turbine **210**. The steam turbine **204** may include at least one high pressure section **212**, at least one intermediate pressure section **214**, and at least one low pressure section **216**, wherein the at least one low pressure section **216** may exhaust into a condenser **218**. The steam turbine **204** also drives a generator **220** that produces electrical power (or other load). The gas turbine **202** and steam turbine **204** are associated in tandem via a single shaft **222** that drives a single generator **220**, though each may alternately drive separate loads.

The gas turbine **202** and steam turbine **204** are additionally associated with a multi-pressure heat recovery steam generator (HRSG) **224**, which includes a high pressure (HP) region **233**, an intermediate pressure (IP) region **231**, and a low pressure (LP) region **229**. The HRSG **224** also includes a steam circuit, which transports steam and water. The steam circuit is too expansive and complex to designate as a singular structure within the illustration, and thus will be named and numbered in sections hereinbelow. The HRSG **224** is associated with the gas turbine **202** via an exhaust gas conduit **256**, which transports heated gas into the HRSG **224**, and is associated with the steam turbine **204** via the steam circuit.

The steam circuit includes at least one superheater **245**. The at least one superheater **245** to be discussed in detail is a high pressure (in relation to its positioning within the HRSG **224** and designated henceforth as HP) superheater circuit **244**, illustrated to include a first HP superheater section **246**, a second HP superheater section **248**, and a third HP superheater section **249** although steam temperature control could be achieved with a single (one pass circuit) superheater section. The first HP superheater section **246**, the second HP superheater section **248**, and the third HP superheater section **249** are associated with each other within the HP superheater **244** in a manner that allows steam to flow downstream from the first HP superheater section **246**, through the second HP superheater section **248**, and into the third HP superheater section **249**. The LP region **229** and IP region **231** of the HRSG **224** may optionally include an LP superheater **242** and an IP superheater **243**.

The steam circuit also includes a reheater circuit **250**, illustrated to include a first reheater section **252** and a second reheater section **254**, although steam temperature control could be achieved with a single (one pass circuit) reheater section. The first reheater section **252** and the second reheater section **254** are associated with each other within the reheater circuit **250** in a manner which allows steam to flow downstream from the first reheater section **252** to the second reheater section **254**.

The steam circuit further includes at least one dilution region and at least one supply region, wherein the at least one dilution region is illustrated as a superheater dilution region **266** and a reheater dilution region **272**, and at least one supply region is illustrated as a superheater supply region **264** and a reheater supply region **271**. The at least one dilution region and the at least one supply region are associated via at least one cooling coil, wherein the at least one cooling coil is illustrated as a superheater cooling coil **276** and a reheater cooling coil **278**. The at least one cooling coil is at least partially disposed within at least one cooling area, such as at least one cooling cavity defined by at least one cooling drum, which will be described in greater detail below.

With reference again to the steam circuit, there is also included at least one economizer (illustrated throughout at **232**) and at least one evaporator. The at least one evaporator may include an LP evaporator **238**, an IP evaporator **239**, and an HP evaporator **240**, wherein at least one of the LP evaporator **238**, IP evaporator **239**, and HP evaporator **240** may include the at least one cooling drum, briefly mentioned above, and illustrated in FIG. **2** as an HP cooling drum **241** included in the HP evaporator **240**.

The HP cooling drum **241** defines the cooling cavity **280**, also mentioned above, which contains a fluid **281**. The HP cooling drum **241** also defines a superheater coil inlet opening **282**, a superheater coil exit opening **284**, a reheater coil inlet opening **286**, and a reheater coil exit opening **288**. The superheater coil inlet opening **282** and superheater coil exit opening **284** are disposed to allow the superheater cooling coil **276** to enter and exit the cooling cavity **280**. Similarly, the reheater coil inlet opening **286** and reheater coil exit opening **288** are disposed to allow the reheater cooling coil **278** to also enter and exit the cooling cavity **280**. The portions (at least a portion of each) of both the superheater cooling coil **276** and reheater cooling coil **278**, which are contained within the cooling cavity **280**, are submerged within the containing fluid **281** (water) to effect a cooling process of the steam within the coils.

Again referring back to the steam circuit, it should be appreciated that there is included at least one steam flow controlling device disposed along the steam circuit, wherein the at least one steam flow controlling device may be a device such as at least one valve, illustrated as at least one superheater coil valve **277** and at least one reheater coil valve **279**.

With the components of the system **200** introduced (excepting some illustrated steam circuit sections and pumps), the manner in which these components interact will now be discussed. Condensate is fed from the condenser **218** to the LP region **229** of the HRSG **224** via at least one condensate line **228** (section of the steam circuit) with the aid of a condensate pump **258**. The condensate subsequently traverses at least one economizer **232** and the LP evaporator **238**, before being superheated and returned to the at least one low pressure section **216** of the steam turbine **204** via at least one low pressure conduit **228***a* (section of the steam circuit).

With the aid of a pump **260**, feedwater passes into the LP region **229** of the HRSG **224**, wherein the feedwater travels to at least one economizer **232** and into the IP evaporator **239** and HP evaporator **240**. The HP evaporator **240** thus recovers exhaust energy necessary to supply a latent heat that converts feedwater to HP steam. Steam exiting the HP evaporator **240** is transported on to the HP superheater circuit **244** via a steam conduit **228*b*** (section of the steam circuit). Similarly, the IP evaporator **239** recovers exhaust energy necessary to supply a latent heat that converts feedwater to IP steam, wherein the steam is transported from the IP evaporator **239** to the reheater circuit **250** via at least one a steam conduit **228*c*** (section of the steam circuit).

Steam traveling from the HP evaporator **240** enters the HP superheater circuit **244**, and travels through the first HP superheater section **246** and second HP superheater section **248**. From the second HP superheater section **248**, at least a portion of the steam passes into at least one of the third HP superheater section **249** and the superheater cooling coil **276** with the aid of the at least one superheater coil valve **277**. If any portion of the steam passes to the superheater cooling coil **276**, it does so by exiting the second HP superheater section **248** from the superheater supply region **264**.

Steam which does pass into the at least one superheater cooling coil **276** traverses the at least one superheater cooling coil **276**, including the portion contained within the cooling cavity **280** of the HP cooling drum **241**, wherein the fluid **281** within the cooling cavity **280** cools the steam within the at least one superheater cooling coil **276**. The at least one superheater coil valve **277** may then allow the cooled steam from the at least one superheater cooling coil **276** to pass into the at least one superheater dilution region **266**, wherein the cooled steam from the superheater cooling coil **276** may dilute and cool/control the temperature of the steam passing from the second HP superheater section **248** into the third HP superheater section **249** without use of water spray attemperation. Eliminating water spray attemperation further eliminates the performance penalty associated with supplying the latent heat of vaporization for a water spray entirely with exhaust energy hotter than the water saturation temperature, improving combined cycle efficiency. Whether diluted or not, the steam which passes into the third HP superheater section **249** traverses the third HP superheater section **249**, and exits the third HP superheater section **249** and HP superheater circuit **244** in general.

Referring now to the reheater circuit **250**, steam from at least one of the steam turbine **204** and the IP superheater **243** enters the reheater circuit **250**, and travel through the first reheater section **252**. From the first reheater section **252**, at least a portion of the steam passes onto at least one of the second reheater section **254** and the reheater cooling coil **278** with the aid of the at least one reheater coil valve **279**. If any portion of the steam passes to the at least one reheater cooling coil **278**, it does so by exiting the first reheater section **252** from the reheater supply region **271**.

Steam which passes into the reheater cooling coil **278** traverses the reheater cooling coil **278**, including the portion contained within the cooling cavity **280** of the HP cooling drum **241**, wherein the fluid **281** within the cooling cavity **280** cools the steam within the reheater cooling coil **278**. The at least one reheater coil valve **279** may then allow the cooled steam from the reheater cooling coil **278** to pass into the at least one reheater dilution region **272**, wherein the cooled steam from the reheater cooling coil **278** dilutes and thus cools/controls the steam which has traversed and been heated in the first reheater section **252**, preventing steam in the reheater circuit **250** from exceeding the rated temperature of the HRSG **224**, the IP steam turbine **204**, and/or steam circuit without use of water spray attemperation. Eliminating water spray attemperation further eliminates the performance penalty associated with supplying the latent heat of vaporization for a water spray entirely with exhaust energy hotter than the water saturation temperature, improving combined cycle efficiency.

Whether diluted or not, the steam which passes into the second superheater section **248** traverses the second reheater section **254**, and exits the second reheater section **254** and reheater **250** in general.

It should be appreciated, as was briefly mentioned above, that only one superheater and reheater pass is necessary to achieve a desired dilution of steam in superheater and reheater circuits. This could be achieved by disposing respective dilution regions downstream of (or in close proximity to) superheater circuit and reheater circuit exits. Multiple sections are typically employed however, (as is illustrated) so as to improve operability and cost. In addition, though the superheater and reheater supply regions **264** and **271** are illustrated upstream of the respective superheater and reheater dilution regions **266** and **272**, this positioning is not necessary to the system **200**. For example, a supply region could contain superheated or reheated steam hotter than steam contained within a counterpart dilution region, because that hotter steam will be cooled in the cooling coil before reaching the counterpart dilution region.

Referring to FIG. **3**, a method **300** for controlling steam temperature is illustrated and includes attemperating reheat steam within at least one reheater dilution region **155** of a steam circuit with steam from at least one reheater supply region **141** of the steam circuit, as shown in Operational Block **302**, wherein the at least one reheater supply region **141** is disposed upstream (in relation to steam flow) of the dilution region **155**. Attemperation occurs via a reheater dilution conduit **178**, which, along with a reheater circuit **150**, associates the at least one reheater supply region **141** with the at least one reheater dilution region **155**.

Referring to FIG. **4**, a method **400** for controlling steam temperature is illustrated and includes attemperating steam within at least one dilution region of a steam circuit **228** with steam from at least one coolant coil, as shown in Operational Block **402**, wherein the at least one cooling coil is disposed at least partially within at least one cooling area. The method **400** further includes associating the at least one dilution region with at least one supply region via the at least one cooling coil. This method can be applied to a reheater circuit **250** and/or a superheater circuit such as an HP superheater circuit **244**.

While the invention has been described with reference to an exemplary embodiment, it should be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or substance to the teachings of the invention without departing from the scope thereof. Therefore, it is important that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the apportioned claims. Moreover, unless specifically stated any use of the terms first, second, etc. do not denote any order or importance, but rather the terms first, second, etc. are used to distinguish one element from another.

What is claimed is:

1. A system for controlling steam temperature the system comprising:

a steam circuit including a reheater circuit;

at least one reheater dilution region;

at least one reheater dilution conduit; and

at least one reheater supply region disposed upstream in said steam circuit of said at least one reheater dilution region, wherein said at least one reheater supply region and said at least one reheater dilution region are in direct fluid communication via each of said reheater circuit and said at least one reheater dilution conduit.

2. A system for controlling a steam temperature according to claim **1**, further including at least one steam flow controlling device associated with at least one of said reheater circuit and said at least one reheater conduit.

3. A system for controlling a steam temperature according to claim **2**, wherein at least one steam flow controlling device includes at least one valve.

4. A system for controlling steam temperature, the system comprising:

a steam circuit including at least one dilution region and at least one supply region;

at least one cooling area; and

at least one cooling conduit, wherein said at least one dilution region and said at least one supply region are in direct fluid communication via each of said steam circuit and said at least one cooling conduit, and wherein said at least one cooling conduit is at least partially disposed within said at least one cooling area.

5. A system for controlling a steam temperature according to claim **4**, wherein said at least one cooling area is at least one cooling drum defining a cooling cavity.

6. A system for controlling a steam temperature according to claim **4**, further including at least one steam flow controlling device disposed along said steam circuit.

7. A system for controlling a steam temperature according to claim **6**, wherein at least one steam flow controlling device includes at least one valve.

8. A system for controlling a steam temperature according to claim **4**, wherein said steam circuit includes a high pressure superheater circuit, a superheater dilution region, and a superheater cooling conduit.

9. A system for controlling a steam temperature according to claim **4**, wherein said steam circuit includes a reheater circuit, a reheater dilution region, and a reheater cooling conduit.

10. A system for controlling a steam temperature according to claim **5**, wherein said cooling cavity contains a fluid, and said at least one cooling conduit is at least partially submerged within said fluid.

11. A method for controlling steam temperature, the method comprising:

disposing at least one reheater dilution region in direct fluid communication with at least one reheater supply region via each of a reheater circuit included in a steam circuit and at least one reheater dilution conduit; and

attemperating reheat steam within said at least one reheater dilution region of said steam circuit with steam from said at least one reheater supply region of said steam circuit, wherein said at least one reheater supply region is disposed upstream of said reheater dilution region.

12. A method for controlling steam temperature, the method comprising:

disposing at least one dilution region in direct fluid communication with at least one supply region via each of a steam circuit and at least one cooling conduit; and

attemperating steam within said at least one dilution region of said steam circuit with steam from said at least one cooling conduit, wherein said at least one cooling conduit is disposed at least partially within at least one cooling area.

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